Overview of the Climate, Ocean, and Sea Ice Modeling (COSIM) project

Bob Malone
Los Alamos National Laboratory

COSIM was established under DOE's CHAMMP program. Our mandate, first under CHAMMP and then under CCPP, was and remains the development, optimization, and scientific evaluation and validation of state-of-the-art ocean and sea ice models for massively parallel computers. We maintain and develop two radically different ocean models, the Parallel Ocean Program (POP) and the Miami Isopycnic Coordinate Ocean Model (MICOM), as well as a sea ice model (CICE). Both POP and MICOM are three-dimensional, time-dependent models, but they differ in their treatment of the vertical coordinate. POP uses fixed Eulerian depth levels while MICOM uses isopycnic (constant density) surfaces. The former gives a better representation in the mixed layer, but the latter is superior in the density-stratified ocean below the mixed layer. POP and MICOM are being compared with each other and with observational data. Each model is being extended to a hybrid vertical coordinate using different approaches in the two models. Our partnerships with other institutions to develop coupled climate models based on POP, MICOM and/or CICE will be discussed, as will the major simulations we are planning to do or are doing now.